

APPARATUS FOR PERFORMING WEATHER RESISTANCE TEST

This application is a continuation of application Ser. No. 08/173,929 filed Dec. 28, 1993, now abandoned, which was a continuation of application Ser. No. 07/534,576 filed Jun. 6, 1990, now abandoned.

BACKGROUND OF THE INVENTION

The present invention relates to a method of and an apparatus for performing a weather resistance test. More particularly, the invention is concerned with a method of and apparatus for performing a weather resistance test capable of producing, in a short time, test results having close correlation to actual degradation which is caused on a composite material having a base member of a metal, an inorganic material or an organic material and a coating layer of an organic material, e.g., a plastic when such a composite material is left in natural environment including corrosive substances.

In general, weather resistance of plastics and materials coated with plastics is tested by a weather resistance testing apparatus as specified by JIS (Japanese Industrial Standards) B 7751-7754. Usually, this testing apparatus employs a light source such as a carbon arc lamp or a xenon lamp for generating light rays which are applied to the test samples to promote the degradation thereby enabling the test to be finished in a short time.

In general, structures in seashore areas are exposed to air which is rich in salt, while offshore structures are held in corrosive condition due to contact with sea water. Thus, structures on seashores and offshore structures are exposed to much severe condition as compared with structures in environment which do not contain salty air. Furthermore, in industrial areas where there are many factories, structures are under severe conditions as they are often subjected to acidic rain. The ordinary weather test apparatus mentioned above, therefore, cannot perform promoted test results with good correlation to actual degradation, when the material to be tested is a composite material composed of a metallic substrate and a coating plastic, as in the cases of materials used in structures on seashore areas, offshore structures, ships and fishery equipments, as well as structures in industrial areas.

A composite weather resistance testing apparatus has been known in which a brine spray process is combined with functions of ordinary weather meter such as light irradiation and dew condensation to enable evaluation of resistance to salty environment. A marine exposure promotion testing apparatus is also known in which, as disclosed in Japanese Utility Model Laid-Open No. 55-105153, the tested material is subjected to light irradiation, brine spray and strain.

The known composite testing apparatus and marine exposure promotion testing apparatus, however, can provide only a small ultraviolet irradiation intensity, e.g., 6 mW/cm², due to the use of a carbon arc lamp or a xenon lamp as the light source. In addition, the speed of degradation of the tested material is too low and the test results do not show close correlation to actual degradation, due to the fact that the test operation includes only the testing processes such as light irradiation, brine spray, dew condensation and generation of strain.

SUMMARY OF THE INVENTION

In order to overcome the above-described problems encountered with known weather resistance testing method and apparatus incorporating brine condition, the present invention is aimed at providing a method of and an apparatus for performing a weather resistance test which can provide, in a short time, test results of good correlation to the actual natural degradation under corrosive environment rich in salt or acidic rain.

To this end, according to one aspect of the present invention, there is provided a method of performing a weather resistance test on a composite material having a base member made of a metallic, inorganic or an organic material and a covering material of an organic material covering the base member, the method having the steps of preparing a sample of the composite material, irradiating step for irradiating the sample with light rays including ultraviolet rays from an artificial light source, dipping step for dipping the sample in a corrosive ionized water, and dew condensation step for causing dew condensation on the surface of the sample, the method being characterized by comprising: a cleaning step for cleaning the surface of the sample; and a steaming step for subjecting the sample to an atmosphere having high temperature and high humidity.

The cleaning step removes, from the surface of the test piece, matters which have been formed in the step of irradiation with lights including ultraviolet rays, so as to facilitate execution of a subsequent step, e.g., to facilitate permeation of ionized water such as brine in the dipping step executed subsequently to the light irradiation step, thereby promoting the degradation. The steaming step for exposing the test piece to an atmosphere of high temperature and high humidity simulates a hot and humid weather condition, thus contributing to prompt development of results with close correlation to actual degradation.

According to another aspect of the present invention, there is provided an apparatus for performing a weather resistance test on a composite material having a metallic, inorganic or an organic base member and an organic material covering the base member, comprising: sample holding means for holding a sample of the composite material; irradiating means including an artificial light source for irradiating one surface of the sample with light rays containing ultraviolet rays; dipping means for dipping the sample in a corrosive ionized water; dew condensation means including moistening means for causing dew condensation in the surface of the sample; cleaning means for cleaning the surface of the sample; steaming means including heating means and humidifying means for steaming the sample in an atmosphere of high temperature and high humidity; and control means for controlling execution of operations of the irradiating means, dipping means, dew condensation means, cleaning means and steaming means in a sequential manner.

The use of the cleaning means for cleaning the test piece surface and the steaming means for exposing the test piece to an atmosphere of high temperature and high humidity makes it possible to provide a weather resistance testing apparatus which is capable of promptly developing test results with high degree of correlation to the actual degradation.

These and other objects, features and advantages of the present invention will become clear from the following description of the preferred embodiments when the same is read in conjunction with the accompanying drawings.